



Bengalla Mining Company Pty Limited

Air Quality Management Plan

Revision	Date Submitted	Date Approved	Description	Author	Reviewer	Approved
1	25/08/15	-	Draft AQMP for SSD-5170 (as modified) for consultation	D Munro Hansen Bailey	D Walsh Hansen Bailey	C White BMC
2	08/02/16	-	AQMP Update with comments from DP&E and EPA	N Dobbins Hansen Bailey	D Munro Hansen Bailey	C White BMC
3	26/07/16	-	Update for SSD-5170 (as modified) MOD 1 & MOD 2	D Munro Hansen Bailey	D Munro Hansen Bailey	C White BMC
4	12/05/17	18/08/17	Update for SSD-5170 (as modified) MOD 3	N Dobbins Hansen Bailey	D Munro Hansen Bailey	C White BMC
5	29/04/19	-	Update for SSD-5170 (as modified) MOD 4	L McGinnity BMC	-	C White BMC
5	03/05/19	-	Update for SSD-5170 (as modified) MOD 4 - Revised	L McGinnity BMC	-	C White BMC
6	09/07/19	-	Update for SSD-5170 (as modified) MOD 4 - Revised	L McGinnity BMC	-	C White BMC
8	15/11/19	-	Update for SSD-5170 (as modified) MOD 4 - Revised	P Madden BMC	-	C White BMC
9	17/04/20	-	Update for SSD-5170 (as modified) MOD 4 - Revised	D Walsh Hansen Bailey	-	C White BMC
10	13/11/20	-	Update for SSD-5170 (as modified) MOD 4 - Revised	J Bailey Hansen Bailey	-	C White BMC
11	10/09/21	-	Update for SSD-5170 Modification 4	C White BMC	-	C White BMC
12	1/11/2022		Update for SSD-5170 Modification 5 and address residual DPE comments	C White BMC	-	C White BMC

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1.0 INTRODUCTION

This section provides background information on the Bengalla Mine, describes Bengalla and its approvals history, and outlines the structure of this Air Quality Management Plan.

1.1 Background

Bengalla Mining Company Pty Limited (BMC) operates the Bengalla Mine (Bengalla) which is located approximately 4 km west of Muswellbrook in the Upper Hunter Valley, New South Wales (NSW). Bengalla is generally bounded by Wybong Road to the north, Overton Road to the east and the Muswellbrook-Ulan Rail Line to the south and Roxburgh Road to the west (see Figure 1).

BMC was granted Development Consent for State Significant Development (SSD) 5170 on 3 March 2015 by the Secretary of the Department of Planning and Environment (DP&E) for the Continuation of Bengalla Mine. SSD-5170 (as modified) enables BMC to continue open cut coal mining of up to 15 Million tonnes per annum (Mtpa) of run of mine (ROM) coal until 2039.

1.2 History of Operations

1.2.1 Introduction

BMC was originally granted Development Consent Development Application (DA) 211/93 to construct and operate an open cut coal mine and associated activities and commenced mining in 1998.

1.2.2 State Significant Development 5170

In September 2013, BMC sought a new development consent under Division 4.1 of Part 4 of the *Environmental Planning and Assessment Act 1979* (EP&A Act) to enable continued mining operations at Bengalla. The application was supported by the '*Continuation of Bengalla Mine Environmental Impact Statement*' (6 volumes) dated September 2013 as modified by the '*Continuation of Bengalla Mine Response to Submissions*' dated March 2014 (EIS) prepared by Hansen Bailey.

On 3 March 2015, the Secretary of the DP&E, now the Department of Planning, Industry and Environment (DPIE) as delegate of the Minister for Planning granted SSD-5170 which permits the following activities at Bengalla:

- Open cut mining towards the west at a rate of up to 15 Mtpa ROM coal until 2039;
- Continued use of the existing dragline, truck fleet and excavator;
- An out of pit Overburden Emplacement Area (OEA) to the west of Dry Creek which may be utilised for excess spoil material until it is intercepted by mining;
- Various upgrades, relocations or additional new infrastructure to support the Project;
- Processing, handling and transportation of coal via the (upgraded) Coal Handling and Preparation Plant (CHPP) and rail loop for export and domestic sale;

- Continued rejects and tailings co-disposal in the Main OEA and temporary in pit reject emplacement;
- Relocation of a 6 km section of Bengalla Link Road at approximately Year 15 near the existing mine access road to facilitate coal extraction;
- The diversion of Dry Creek via dams and pipe work with a later permanent alignment of Dry Creek through rehabilitation areas when emplacement areas are suitably advanced;
- Relocation of water storage infrastructure as mining progresses through existing dams (including the Staged Discharge Dam and Hunter River Raw water dam); and
- A workforce of approximately 900 full time equivalent personnel (plus contractors) at peak production.



BENGALLA MINE

Regional Locality

FIGURE 1

1.2.3 Bengalla Development Consent – Modification 1

SSD-5170 was modified on 16 December 2015 (MOD 1) by the Executive Director – Resource Assessments and Compliance for the DP&E (as delegate of the Minister for Planning) for the activities largely described in the '*Bengalla Mine Development Consent Modification Statement of Environmental Effects*' dated August 2015 and prepared by Hansen Bailey including the Response to Submissions document dated October 2015 (MOD 1 SEE). The MOD 1 SEE provides approval for the following:

- Alterations to various water management infrastructure components including:
 - Utilisation of the Satellite Pit as a temporary mine water catchment dam;
 - Relocation of the Staged Discharge Dam and the Hunter River Salinity Trading Scheme (HRSTS) staged discharge release point;
 - Construction of clean water diversion levees in locations other than those already approved; and
 - Revised locations for the proposed relocation of the Hunter River Raw Water Dam and Washery Dam;
- Additional locations for the siting of the Explosives Storage Facility; and
- Placement of fill from the excavation of the Dry Creek Clean Water Dam (CW1) adjacent to it.

1.2.4 Bengalla Development Consent – Modification 2

SSD-5170 was modified on 1 July 2016 (MOD 2) by the Director – Resource Assessments for the DP&E as delegate of the Minister for Planning for the activities largely described in the '*Bengalla Mine Development Consent Modification Statement of Environmental Effects*' dated April 2016 and prepared by Hansen Bailey including the Response to Submissions document dated June 2016 (MOD 2 SEE). The MOD 2 SEE provides approval for the following:

- Alterations to the approved height of the Main OEA to improve visual amenity from primary viewing locations in and surrounding the township of Muswellbrook and Denman Road, in two selected locations (Visual Relief Areas):
 - The Northern Relief Area constructed to a maximum height of Reduced Level (RL) 300; and
 - The Southern Relief Area constructed to a maximum height of RL 290.
- Establishment of a new gravel access road from Wybong Road to the Dry Creek Diversion Project Construction Site Office being a former homestead (Homestead Access).

1.2.5 Bengalla Development Consent – Modification 3

SSD-5170 was modified on 23 December 2016 (MOD 3) by the Director – Resource Assessments for the DP&E as delegate of the Minister for Planning for the activities largely described in the '*Bengalla Mine Development Consent Modification 3 Statement of Environmental Effects*' dated September 2016 and prepared by Hansen Bailey including the Response to Submissions document dated November 2016 (MOD 3 SEE). The MOD 3 SEE provides approval for the repositioning of the following approved activities:

- The construction and operation of an explosives facility and reload facility;
- The alignment of the Hunter River pipeline; and
- The emplacement and use of temporary topsoil stockpiles during the mining process.

1.2.6 Bengalla Development Consent – Modification 4

SSD-5170 was modified on 19 December 2018 (MOD 4) by the Director – Resource Assessments as delegate of the Minister for Planning for the activities described in the '*Bengalla Mine Development Consent Modification 4 Statement of Environmental Effects*' dated December 2017 and prepared by Hansen Bailey including the Response to Submissions document dated May 2018 and additional information provided in July 2018 and August 2018 (MOD 4 SEE). The MOD 4 SEE provides approval for the following:

- Changes to the approved water management system to reflect operations at Bengalla including proposed enlargement of the approved SDD (ED1), and construction and use of the Dry Creek East Dam;
- Temporary storage of approximately 2,500 m³ of excess materials from the construction of ED1;
- Increase in the capacity and additional locations of ROM coal stockpiles;
- Additional storage locations for temporary emplacement of coal processing reject material, prior to permanent emplacement; and
- Temporary clay emplacement within the Main OEA or to the west of this for later use in the reinstatement of Dry Creek.

The development layout is presented in Figure 2.

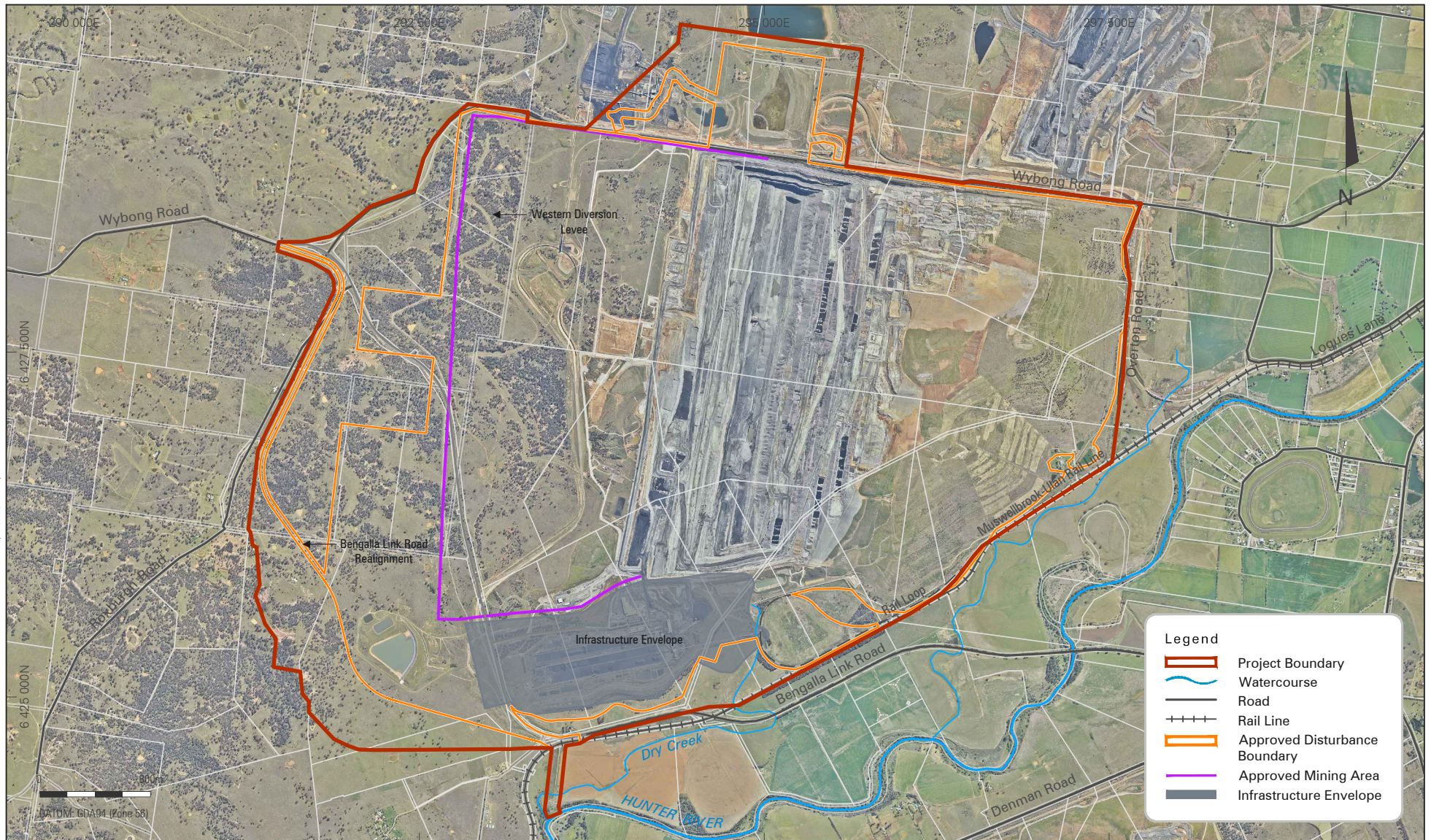
1.2.7 Bengalla Development Consent – Modification 5

BMC is currently awaiting determination of Modification 5 to SSD-5170 under section 4.55(2) of the EP&A Act to facilitate the following activities:

- Operation of a mobile rock crushing facility and ancillary equipment, and the use of that crushed rock at Bengalla;

- Geotechnical investigations in connection with any activities approved under SSD-5170 from time to time;
- Prospecting operations (including exploration drilling) in accordance with BMC's mining leases issued under the Mining Act 1992 (Mining Act);
- Realignment of the Western Diversion Levee within the approved Disturbance Boundary;
- Enlargement of the ROM coal stockpile located adjacent to the ROM dump hopper from 40 kt to 150 kt approximate maximum capacity;
- Upgrade/widening of an existing haul road (Southern Endwall Road) adjacent to the Southern visual bund, which may require removal of part of the visual bund (to be replaced by an equivalent measure);
- Disposal of tyres in pit; and
- Minor administrative changes to conditions of SSD-5170.

The Modification Application and supporting '*Bengalla Coal Mine Modification 5 to SSD-5170 Modification Report*' (Modification Report) (James Bailey Associates, 2021) was prepared and placed on public exhibition from 13 January 2022 until 28 January 2022. The Submissions Report has been prepared to respond to issues raised during the exhibition period and submitted on 30 July 2022.



BENGALLA MINE

Approved Development Layout

FIGURE 2



1.3 Document Structure

This Air Quality Management Plan (AQMP) is structured as follows:

- Section 1.0 provides background information on Bengalla, describes Bengalla and its approvals history, and outlines the structure of this AQMP;
- Section 2.0 details the air quality management conditions in SSD-5170 and where those conditions are addressed;
- Section 3.0 provides a summary of regulatory consultation undertaken as part of the development of this AQMP;
- Section 4.0 details the air quality management approach, existing and new air quality monitoring network transition and standard control measures;
- Section 5.0 describes the predictive and reactive air quality management system;
- Section 6.0 describes the existing and proposed air quality monitoring network;
- Section 7.0 describes the trigger action response plan;
- Section 8.0 includes greenhouse gas sources, odour sources and management measures;
- Section 9.0 provides details on landholder notifications, mitigation and acquisition;
- Section 10.0 provides a summary of reporting and auditing requirements;
- Section 11.0 provides a summary of responsibilities; and
- Section 12.0 lists the reference documents relevant to this AQMP.

2.0 STATUTORY REQUIREMENTS

This section details the air quality conditions in MOD 4 and where those conditions are addressed.

2.1 Development Consent

SSD-5170 contains conditions that relate to Air Quality including the preparation and implementation of this AQMP.

2.1.1 Land Ownership

Figure 3 shows the land ownership around Bengalla and indicates where land is mine owned.

Table 1 includes individual numbers for private residences which correlate to the Receiver IDs in Figure 3. Table 1 identifies the private properties with rights to acquisition or mitigation upon request as described in Schedule 3, Conditions 1-3 of SSD-5170 as at 19 December 2018 (being the date of approval of MOD 4).

Blue shading indicates rights to acquisition or mitigation by BMC if the rights are no longer available under Mount Arthur Coal's (MAC) Development Approval. Olive shading indicates rights to acquisition or mitigation by BMC if the rights are no longer available under Mount Pleasant Project's (MTP) Development Approval (as described in in Schedule 3, Conditions 1-3 of SSD-5170 as at 19 December 2018).

Table 1
Land Ownership and Receivers' Rights under SSD-5170

ID	Acquisition		Mitigation	
	Air	Noise	Air	Noise
66			✓	
105				✓
106				✓
108				✓
109			✓	✓
110				✓
112	✓	✓		
113	✓	✓		
114	✓	✓		
117	✓	✓		
118	✓	✓		
119	✓	✓		
120		✓	✓	
126N				✓
152		✓	✓	
153		✓		
154	✓	✓		
155	✓	✓		
156E		✓	✓	
156S		✓	✓	
166		✓		
167				✓
168	✓	✓		
169				✓
171	✓	✓		
180				✓
184				✓

2.1.2 Air Quality Conditions

Table 2 lists the requirements of SSD-5170 relevant to this AQMP and where each condition is addressed within this AQMP.

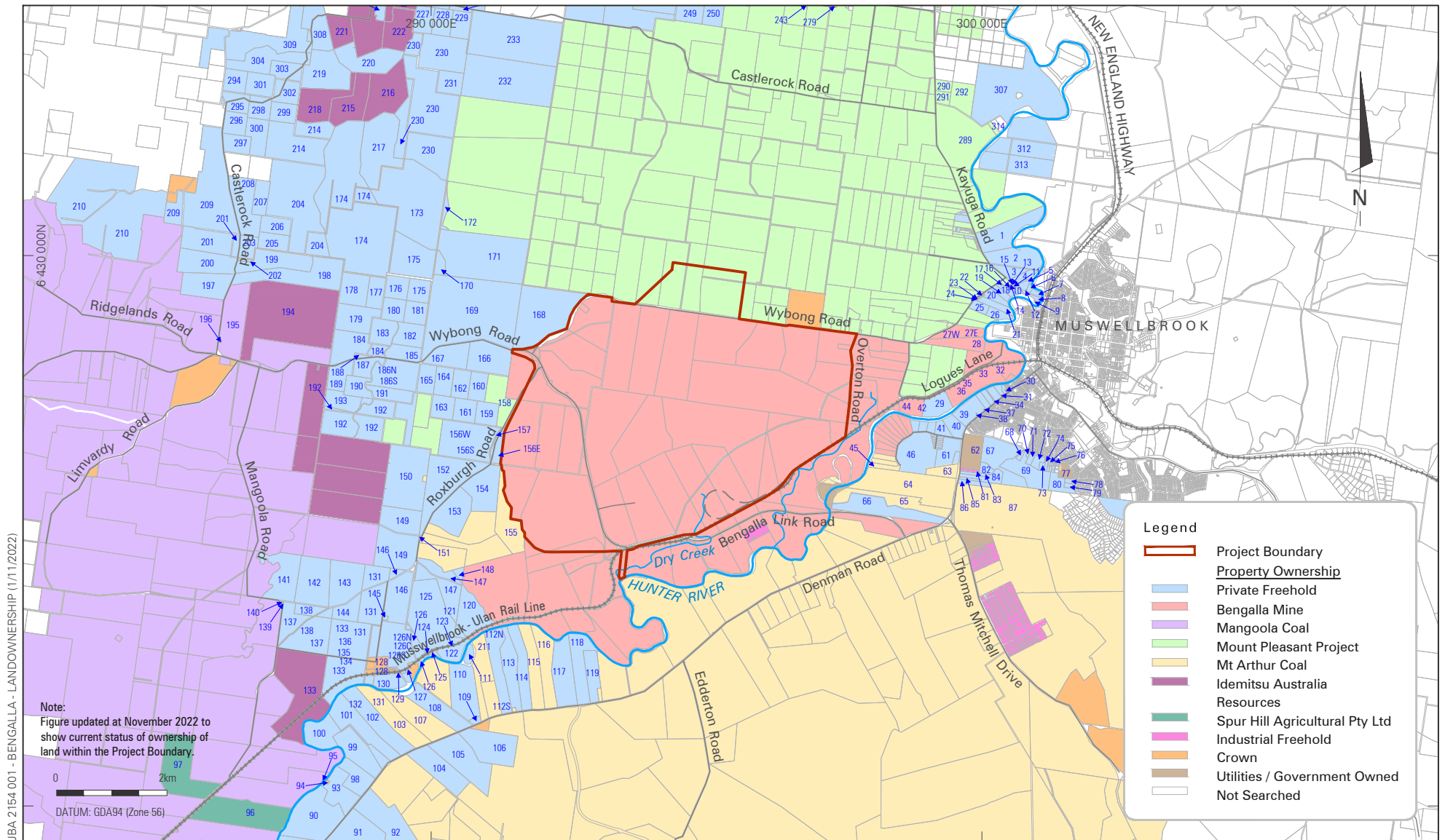
Table 2
MOD 4 Air Quality Conditions Relevant and Where Those Conditions Are Addressed

Ref	Requirement	AQMP Section												
Schedule 3, Condition 16	Except for the air-affected land in Tables 1 and 2, the Applicant must ensure that all reasonable and feasible avoidance and mitigation measures are employed so that the particulate emissions generated by the development do not exceed the criteria listed in Tables 6, 7 and 8 at any residence on privately-owned land.	Sections 2.1.2 4.0, 5.0, 6.0 and 6.3												
	Table 6: Long term criteria for particulate matter													
	<table><tr><th>Pollutant</th><th>Averaging Period</th><th>Criterion</th></tr><tr><td>Total suspended particulate (TSP) matter</td><td>Annual</td><td>^{a, d} 90 µg/m³</td></tr><tr><td>Particulate matter < 10 µg/m³ (PM₁₀)</td><td>Annual</td><td>^{a, d} 25 µg/m³</td></tr><tr><td>Particulate matter < 2.5 µg/m³ (PM_{2.5})</td><td>Annual</td><td>^{a, d} 8 µg/m³</td></tr></table>		Pollutant	Averaging Period	Criterion	Total suspended particulate (TSP) matter	Annual	^{a, d} 90 µg/m ³	Particulate matter < 10 µg/m ³ (PM ₁₀)	Annual	^{a, d} 25 µg/m ³	Particulate matter < 2.5 µg/m ³ (PM _{2.5})	Annual	^{a, d} 8 µg/m ³
	Pollutant		Averaging Period	Criterion										
	Total suspended particulate (TSP) matter		Annual	^{a, d} 90 µg/m ³										
	Particulate matter < 10 µg/m ³ (PM ₁₀)		Annual	^{a, d} 25 µg/m ³										
	Particulate matter < 2.5 µg/m ³ (PM _{2.5})		Annual	^{a, d} 8 µg/m ³										
	Table 7: Short term criterion for particulate matter													
	<table><tr><th>Pollutant</th><th>Averaging Period</th><th>Criterion</th></tr><tr><td>Particulate matter < 10 µg/m³ (PM₁₀)</td><td>24 hour</td><td>^b 50 µg/m³</td></tr><tr><td>Particulate matter < 2.5 µg/m³ (PM_{2.5})</td><td>24 hour</td><td>^b 25 µg/m³</td></tr></table>		Pollutant	Averaging Period	Criterion	Particulate matter < 10 µg/m ³ (PM ₁₀)	24 hour	^b 50 µg/m ³	Particulate matter < 2.5 µg/m ³ (PM _{2.5})	24 hour	^b 25 µg/m ³			
	Pollutant		Averaging Period	Criterion										
Particulate matter < 10 µg/m ³ (PM ₁₀)	24 hour	^b 50 µg/m ³												
Particulate matter < 2.5 µg/m ³ (PM _{2.5})	24 hour	^b 25 µg/m ³												
Table 8: Short term criterion for particulate matter														
<table><tr><th>Pollutant</th><th>Averaging Period</th><th>Maximum increase in deposited dust level</th><th>Maximum total deposited dust level</th></tr><tr><td>^c Deposited dust</td><td>Annual</td><td>^b 2 g/m²/month</td><td>^a 4 g/m²/month</td></tr></table>	Pollutant	Averaging Period	Maximum increase in deposited dust level	Maximum total deposited dust level	^c Deposited dust	Annual	^b 2 g/m ² /month	^a 4 g/m ² /month						
Pollutant	Averaging Period	Maximum increase in deposited dust level	Maximum total deposited dust level											
^c Deposited dust	Annual	^b 2 g/m ² /month	^a 4 g/m ² /month											
Notes for Tables 6 to 8:														
^a Total impact (i.e. incremental increase in concentrations due to the development plus background concentrations due to other sources);														
^b Incremental impact (i.e. incremental increase in concentrations due to the development on its own);														
^c Deposited dust is to be assessed as insoluble solids as defined by Standards Australia, AS/NZS 3580.10.1:2003: Methods for Sampling and Analysis of Ambient Air – Determination of Particulate Matter – Deposited Matter – Gravimetric Method; and														
^d Excludes extraordinary events such as bushfires, prescribed burning, dust storms, sea fog, fire incidents, illegal activities or any other activity agreed to by the Secretary.														
Schedule 3, Condition 18	The Applicant must ensure that all reasonable and feasible avoidance and mitigation measures are employed so that particulate matter emissions generated by the development do not cause exceedances of the criteria in Tables 6, 7 and 8 at any occupied residence on mine-owned land (including land owned by another mining company unless:	Section 9.1												
	(a) the tenant or landowner (if the residence is owned by another mining company) has been notified of any health risks associated with such exceedances in accordance with the notification requirements in schedule 4 of this consent;	Sections 9.1 and 9.2												
	(b) the tenant of any land owned by the Applicant can terminate their tenancy agreement without penalty at any time, subject to giving reasonable notice;													
	(c) air quality monitoring is regularly undertaken to inform the tenant or landowner (if the residence is owned by another mining company) of the actual particulate emissions at the residence; and													

Ref	Requirement	AQMP Section
	to the satisfaction of the Secretary	Section 9.5
Schedule 3, Condition 19	The Applicant must:	
	(a) implement all reasonable and feasible measures to minimise the: - odour, fume and dust emissions of the development; and - release of greenhouse gas emissions from the site;	Sections 4.0, 5.0, 6.0, 6.3 and 8.0, Table 3 and Table 8
	(b) minimise any visible air pollution generated by the development;	Sections 4.0, 5.0, 6.0, 6.3 and Table 3 and Table 8
	(c) minimise the surface disturbance of the site;	Section 4.0 and Table 3
	(d) operate a comprehensive air quality management system that uses a combination of predictive meteorological forecasting, predictive air dispersion modelling and real-time air quality monitoring data to guide the day-to-day planning of mining operations and implementation of both proactive and reactive air quality mitigation measures to ensure compliance with the relevant conditions of this consent;	Sections 4.0, 5.0, 6.0 and 6.3
	(e) minimise the air quality impacts of the development during adverse meteorological conditions and extraordinary events (see note d to Tables 6-8 above);	Section 7.0 and Table 8
	(f) implement all reasonable and feasible measures to co-ordinate the air quality management at the Bengalla mine with the air quality management at the Mt Arthur and Mount Pleasant mines to minimise any cumulative air quality impacts; and	Section 4.4
	(g) monitor and report on compliance with the relevant air quality conditions in this consent,	Section 4.0 and 10.0
	to the satisfaction of the Secretary	
Schedule 3, Condition 20	The Applicant must prepare and implement a detailed Air Quality Management Plan for the development to the satisfaction of the Secretary. This plan must:	This AQMP
	(a) be prepared in consultation with the EPA and Council, and submitted to the Secretary for approval within 6 months of the date of this consent;	Section 3.0 and Appendix C
	(b) describe the measures that would be implemented to ensure compliance with air quality criteria and operating conditions of this consent;	Sections 4.0, 5.0, 6.0 and 6.3
	(c) describe the proposed air quality management system; and	Sections 4.0 and 5.0
	(d) include an air quality monitoring program that: - uses a combination of real-time monitors and supplementary monitors to evaluate the performance of the development against the air quality criteria in this consent; - adequately supports the proactive and reactive air quality management system; and - Evaluates and reports on: - The effectiveness of the air quality management system; and - compliance with the air quality operating conditions; and	Sections 6.0 and 6.3
		Section 5.0
		Section 10.0
	The Applicant must implement the management plan as approved by the Secretary.	Appendix C

Ref	Requirement	AQMP Section												
Schedule 3, Condition 21	Metrological Monitoring 21. During the life of the development, the Applicant must ensure that there is a suitable meteorological station operating in the vicinity of the site that: (a) complies with the requirements in the <i>Approved Methods for Sampling of Air Pollutants in New South Wales</i> guideline; and (b) is capable of continuous real-time measurement of temperature lapse rate in accordance with the <i>NSW Industrial Noise Policy</i> , unless a suitable alternative is approved by the Secretary following consultation with the EPA.	Section 5.2, 6.3.1 and Appendix A												
Schedule 5, Condition 3	Management Plan Requirements The Applicant must ensure that the management plans required under this consent are prepared in accordance with any relevant guidelines, and include: (a) a summary of baseline data; (b) a description of: - the relevant statutory requirements (including any relevant approval, licence or lease conditions); - any relevant limits or performance measures/criteria; - the specific performance indicators that are proposed to be used to judge the performance of, or guide the implementation of, the development or any management measures; (c) a description of the measures that would be implemented to comply with the relevant statutory requirements, limits, or performance measures/criteria; (d) a program to monitor and report on the: - impacts and environmental performance of the development; - effectiveness of any management measures (see c above); (e) a contingency plan to manage any unpredicted impacts and their consequences; (f) a program to investigate and implement ways to improve the environmental performance of the development over time; (g) a protocol for managing and reporting any: - Incidents; - Complaints; - Non-compliances with statutory requirements; and - Exceedances of the impact assessment criteria and/or performance criteria; and (h) a protocol for periodic review of the plan. <i>Note: The Secretary may review some of these requirements if they are unnecessary or unwarranted for particular management plans.</i>	Appendix D Table 1 and Table 2 Section 4.0, 5.0, 6.0 and 6.3 Section 10.0 Section 10.9 Section 10.7 Section 10.4 Section 10.3												
EPL 6538														
P1.1	The following points referred to in the table below are identified in this licence for the purposes of monitoring and/or the setting of limits for the emission of pollutants to the air from the point. <table><tr><th colspan="4">Air</th></tr><tr><th>EPA Identification No</th><th>Type of Monitoring Point</th><th>Type of Discharge Point</th><th>Location Description</th></tr><tr><td>22</td><td>Particulate Matter Monitoring</td><td></td><td>Monitoring at coordinates 296414, 6425580 (Easting, Northing), shown as 'EPA22' on Figure 1</td></tr></table>	Air				EPA Identification No	Type of Monitoring Point	Type of Discharge Point	Location Description	22	Particulate Matter Monitoring		Monitoring at coordinates 296414, 6425580 (Easting, Northing), shown as 'EPA22' on Figure 1	The EPA air quality monitors nominated in EPL 6538 do not form part of the air quality monitoring network described in this AQMP (they are separate
Air														
EPA Identification No	Type of Monitoring Point	Type of Discharge Point	Location Description											
22	Particulate Matter Monitoring		Monitoring at coordinates 296414, 6425580 (Easting, Northing), shown as 'EPA22' on Figure 1											

Ref	Requirement				AQMP Section
	23	Particulate Matter Monitoring		Monitoring at coordinates 294330, 6428888 (Easting, Northing), shown as 'EPA23' on Figure 1 - Mined Out	monitors to meet the requirements of the EPL and may change from time to time)
	24	Particulate Matter Monitoring		Monitoring at coordinates 292552, 6429004 (Easting, Northing), shown as 'EPA24' on Figure 1	
O3.1	The premises must be maintained in a condition which minimises or prevents the emission of dust from the premises.				Sections 4.0, 5.0, 6.0 and 6.3
O3.2	All operations and activities occurring at the premises must be carried out in a manner that will minimise the emission of dust from the premises.				Sections 4.0, 5.0, 6.0 and 6.3
O3.3	All trafficable areas, coal storage areas and vehicle manoeuvring areas in or on the premises must be maintained, at all times, in a condition that will minimise the emission of wind-blown or traffic generated dust from the premises.				Sections 4.0, 5.0, 6.0 and 6.3
M2.2	Air Monitoring Requirements Point 22, 23, 24				See comment against Condition P1.1 above
	Pollutant	Units of measure	Frequency	Sampling Method	
	PM10	Micrograms per cubic metre	Continuous	Special Method 1	



BENGALLA PROJECT

Landownership

FIGURE 3

3.0 STAKEHOLDER ENGAGEMENT

This section provides a summary of regulatory consultation undertaken as part of the development of this MOD4 AQMP.

3.1 AQMP 2019

This AQMP has been prepared following the approval of MOD 4. It updates the properties with rights to acquisition and mitigation, the Air Quality Criteria listed in Schedule 3 Tables 6, 7 and 8 of SSD-5170, other conditions relevant to air quality management and includes details of the new air quality monitoring network.

A copy of this AQMP was provided to the Environment Protection Authority (EPA) and Muswellbrook Shire Council (MSC) for comment on 29 April 2019. An amended version of the AQMP was sent to EPA and MSC for further consultation on 16 September 2019. A copy of regulatory correspondence associated with this AQMP is in Appendix C.

4.0 AIR QUALITY MANAGEMENT

This section details air quality management approach, existing and new air quality monitoring network transition and standard control measures.

4.1 Introduction

Air quality management at Bengalla must be undertaken in accordance with SSD-5170. Operations under SSD-5170 commenced on 1 October 2015. Relevant conditions of SSD-5170 include the following:

- Schedule 2 Condition 1 provides that BMC must implement all reasonable¹ and feasible² measures to prevent, and if prevention is not reasonable and feasible, minimise, any material harm to the environment³ that may result from the construction and operation of the development⁴ and any rehabilitation required under SSD-5170.
- Schedule 2 Condition 2 provides that BMC must carry out the development generally in accordance with the EIS and the environmental assessments accompanying each of the modification applications.
- Condition 16 Schedule 3 requires BMC to ensure that all reasonable and feasible avoidance and mitigation measures are employed so that the particulate emissions generated by the development do not exceed the applicable air quality criteria at any residence on privately-owned land⁵ (that does not have an acquisition right for air quality).
- Condition 19 Schedule 3 sets out operating conditions for air quality management including a requirement for BMC to implement all reasonable and feasible measures to minimise the dust emissions of the development and to minimise any visible air pollution generated by the development.

The EIS contained air quality modelling (updated in the environmental assessment for MOD 4) to predict the air quality impacts of the development. SSD-5170 (as modified) has been granted based on that modelling and does not prohibit particulate emissions from the site. The consent establishes objective air quality criteria and BMC is required to implement reasonable and feasible avoidance and mitigation measures to ensure those criteria are met and to comply with the applicable air quality operating conditions. This management plan sets out the measures that are directed towards ensuring that the air quality criteria and relevant operating conditions in SSD-5170 are complied with.

¹ MOD 4 Reasonable definition see Appendix B.

² MOD 4 Feasible definition see Appendix B.

³ MOD 4 Material Harm to the Environment definition see Appendix B.

⁴ MOD 4 Development definition see Appendix B.

⁵ MOD 4 Privately-owned land definition see Appendix B.

4.2 Air Quality Standard Control Measures

Table 3 summarises the general air quality management measures that are implemented at Bengalla on an ongoing basis. As described in the EIS (Volume 1 pg. 129), 'BMC will continue to implement best practice dust management practices, including:

- best practice dust management techniques (e.g. water sprays, sheltered emplacement during high wind, minimising fall heights of materials and expected rehabilitation);
- guidance to employees on dust management measures and visual identification of dust for specific sources and activities;
- commitment to achieving 85% control on primary haul roads through watering and/or the use of chemical dust suppression agents;
- the use of automated monitoring systems (visual monitors and dust and wind speed alerts) situated in and around active mining areas that detect adverse dust and meteorological conditions; and
- temporary cessation of particular operations during periods of high dust emissions to reduce the potential for further dust impacts.'

The dust mitigation measures listed in Table 7-3 of Appendix G of the EIS include all reasonable and feasible control measures applicable to Bengalla (see EIS Volume 2 Appendix G pg. 48). The control measures in the EIS described above are generally reflected in the air quality standard control measures in Table 3.

BMC has taken into consideration the possible range of mitigation measures that can be applied collectively to achieve a standard of mine operation consistent with current best practice for the control of dust emissions from coal mines in NSW. The measures applied to the project reflect those outlined in *"NSW Coal Mining Benchmarking Study: International Best Practice Measures to Prevent and/or Minimise Emissions of Particulate Matter from Coal Mining"* (Katestone Environmental, 2010).

Table 3
Air Quality Standard Control Measures

Category	Control Measures
General Dust Mitigation	- Forecasting undertaken to predict the likelihood of potential adverse meteorological conditions. - When alerts occur according to Section 7.0 operations are modified according to this AQMP.
Blasting	- Blasting is required to be undertaken in accordance with the Blast Management Plan (as modified). - Blast management measures are used to minimise impacts from blasting activities through the use of proactive and reactive control measures as management tools including: - Predictive forecasting; - Blasting notification system; - Real-time environmental monitoring system; - Blast design to minimise overpressure, vibration and fume; - Post blast review of monitoring results where appropriate; and - Operation of a telephone complaints line. - Water truck can be requested to drill bench to enable dust suppression. - Fume generation is to be minimised through measures including but not limited to: - Use of blast fume scale and recording of fume incidences; - Use of different explosives in different mining conditions; and - Blast filming to provide a library of reference data.
Bulldozer Movements	- Where available dozers travel on primary haul roads which are dust suppressed. - Minimise travel speed in adverse meteorological conditions. - Minimise impact from dozers operating on OEA during adverse meteorological conditions.
Coal Crushing and Screening	- Crushing plant enclosed with internal water sprays. - Application of water at transfer points on conveyors.
Loading/Unloading Coal Stockpiles	- Stockpiling and recovery of ROM coal is required to be undertaken according to SSD-5170. - Coal stockpile spray systems operate according to the Level 1 Amber Alert in Section 7.0 for wind speed. - Water sprays on ROM bin and pad operate according to Level 1 Amber Alert for wind speed. - Stacker/reclaimers that can vary their height. - Monitoring of the stacker and stockpile height to minimise drop height. - Monitoring of the stacker/reclaimers during operation.
Dragline Operations	- Lift bucket cleanly away from the dig face and hoist up with minimum spillage. - Placement of material in a manner which avoids large rocks rolling down the spoils. - Avoid over-dragging and overflowing the material in the bucket. - Restrict drop height. - Regular assessment of dragline operations.
Drilling	- All drill rigs equipped with dust suppression systems. - When moving off a drill hole minimise disturbance to drill cuttings. - Disturbance to the crust on the drill cuttings is kept to a minimum when loading the shot.

Category	Control Measures
	All drill sites are watered down pre and post drilling to enable crusting of drill cuttings.
Hauling and Grading on Unsealed Roads	- Commitment to achieving 85% control on primary haul roads through watering or chemical suppression. - Heavy vehicle trafficable areas and vehicle manoeuvring areas are maintained. - Restrict vehicle speed. - Trafficable areas are demarcated, and vehicle movements are largely restricted to these areas. - Access roads to site with high volumes of light traffic to be paved. - Fleet optimisation to reduce vehicle kilometres travelled. - Dust suppression when sustained elevated visible dust levels occur.
Trucks Loading/Unloading Overburden	- Minimise drop height for dumping overburden materials. - Watering of the area in the immediate vicinity of where trucks are being loaded/unloaded.
Transfer of Coal	- Enclosure or partial enclosure of conveyors. - Skirting fitted to conveyors at transfer points. - Use of belt cleaning. - Enclosed chutes.
Scrapers	- Where available scrapers travel on primary haul roads. - Modification of topsoil stripping operations according to Section 7.
Train Loading	- Automated loading systems with provision made for telescopic chutes and load profiling. - Maintain a generally consistent profile of coal in rail train wagons. - Limit load size so the edge of the coal in the train wagon is generally below sidewalls of train wagons. - Provision for rail loading facilities to be monitored for the spillage of coal fines and material in the vicinity of the loading bin and rail siding. - Coal spillage to be minimised, collected and disposed.
Loading/Unloading of ROM Coal To / From Trucks	- Minimise drop height for loading/unloading. - ROM hopper is equipped with a roof and is enclosed on 3-sides with automated water curtain. - Dust suppression available during coal handling. - Slower tipping during adverse meteorological conditions.
Wind Erosion of Exposed Areas - Topsoil	- Topsoil stripping areas are minimised. - All site disturbances are managed via the ground disturbance permit system. - Topsoil stripping areas and topsoil stockpile volumes are surveyed as required. - Shaping and management of topsoil stockpiles is required to be undertaken in accordance with the Rehabilitation Management Plan.
Wind Erosion of Exposed Areas - Rehabilitation	Disturbance is undertaken relevant to operational requirements and rehabilitation occurs progressively in accordance with the Rehabilitation Management Plan.

Category	Control Measures
Spontaneous Combustion	• Combustible material disposed of within overburden. • Manage the raw and clean coal stockpiles to avoid spontaneous combustion of the stockpiled coal.
Vehicle Exhaust Emissions	• All vehicles to comply with appropriate emission guidelines and equipment will be properly maintained.
Construction Activities	• Construction activities will incorporate dust minimisation measures such as: ○ Maintaining sufficient levels of moisture on the trafficked surfaces; ○ Limiting vehicle speeds in construction areas; and ○ Rehabilitation of completed sections of the construction site as soon as reasonably practicable.

The standard air quality control measures in Table 3 can generally be grouped into the following categories:

1. infrastructure controls (i.e. systems or equipment attached to infrastructure that assist in minimising dust);
2. operational controls and processes (i.e. operational procedures that are in place to regulate the operation of equipment or carrying out of activities); or
3. activities that are generally practiced to minimise dust emissions of the development and any visible air pollution generated by the development having regard for the conditions at the time.

Where an assessment of dust emissions and visible air pollution generated by the development is undertaken, the appropriate air quality control measures will be determined in consideration of the:

- meteorological conditions at the time;
- location of the activity (e.g. Pre-strip⁶ versus in-pit);
- proximity of the activity to the site⁷ boundary;
- proximity, duration and intensity of the activity in relation to a residence on privately-owned land that does not have an acquisition right for air quality; and
- operational environment for the activity, that is, can the activity be undertaken safely (e.g. additional watering of haul roads after rainfall may make those areas unsafe).

Actions/measures in response to air quality alerts and meteorological conditions are described in the Bengalla Trigger Action Response Plan included in Section 7.0.

⁶ Pre-strip definition see Appendix B.

⁷ MOD 4 Site definition See Appendix B.

4.3 Impact Assessment Criteria

The relevant air quality impact assessment criteria for residences on privately owned land are presented in Table 4 below. This includes any occupied residence on mine owned land unless the tenant has been notified of any health risks.

Table 4
SSD 5170 Air Quality Criteria

Pollutant	Averaging Period	Criterion
Total suspended particulate (TSP) matter	Annual	^{a, d} 90 µg/m ³
Particulate matter < 10 µg/m ³ (PM ₁₀)	Annual	^{a, d} 25 µg/m ³
Particulate matter < 2.5 µg/m ³ (PM _{2.5})	Annual	^{a, d} 8 µg/m ³
Particulate matter < 10 µg/m ³ (PM ₁₀)	24 hour	^b 50 µg/m ³
Particulate matter < 2.5 µg/m ³ (PM _{2.5})	24 hour	^b 25 µg/m ³
^c Maximum increase in deposited dust level	Annual	^b 2 g/m ² /month
^c Maximum total deposited dust level	Annual	^a 4 g/m ² /month

Notes:

^a Total impact (i.e. incremental increase in concentrations due to the development plus background concentrations due to other sources);

^b Incremental impact (i.e. incremental increase in concentrations due to the development on its own);

^c Deposited dust is to be assessed as insoluble solids as defined by Standards Australia, AS/NZS 3580.10.1:2003: Methods for Sampling and Analysis of Ambient Air – Determination of Particulate Matter – Deposited Matter – Gravimetric Method; and

^d Excludes extraordinary events such as bushfires, prescribed burning, dust storms, sea fog, fire incidents, illegal activities or any other activity agreed to by the Secretary.

The table excludes any land eligible for acquisition upon request on the basis of air quality impacts. Schedule 3 Condition 1 provides a list of land as being eligible for acquisition upon request on the basis of air quality impacts. The process for managing landholder and tenant issues is described in Section 9.0.

4.4 Cumulative Impact

Bengalla, MTP and MAC have agreed to coordinate certain functions being:

- exchange of each mines predictive daily forecast with each of the other mines;
- Bengalla inversion tower data to be shared with MTP and MAC;
- meetings are to be held generally each quarter to review air quality monitoring results;
- coordination of blasts to minimise cumulative impacts; and
- explore notification between each mine of unpredicted adverse meteorological conditions.

5.0 PREDICTIVE AND REACTIVE AIR QUALITY MANAGEMENT SYSTEM

This section includes a description of the predictive and reactive air quality management system used at Bengalla.

5.1 Overview

A predictive and reactive air quality management system allows personnel to:

- assess potential offsite air quality impacts against forecast conditions; and
- inform operations based on outputs of the system.

5.2 Components

The predictive and reactive air quality management system at Bengalla includes:

- a predictive component being a daily forecast report using weather forecasts and dispersion modelling;
- a reactive component using real-time meteorological data and air quality monitoring data; and
- trigger alerts for managing potential offsite impacts.

Figure 4 depicts the proactive air quality management procedure based on forecast conditions and real time monitoring. The process for responding to proactive and reactive air quality management system based on forecast conditions and real time monitoring (having regard for trigger values) is outlined in Section 7.0 below.

5.3 Predictive Forecast

A predictive forecast meteorology and dust risk assessment report is emailed generally daily to certain BMC personnel with forecast conditions for the next 48 hours to assist in planning upcoming operations.

5.4 Real-Time Data

Real-time air quality monitoring data and meteorological data are used at Bengalla to assist in day to day management of dust generating activities from the operations.

BMC uses management information systems such as SCADA. The real-time air quality monitoring system triggers when the 24-hour air quality criteria may be exceeded at areas of relevant exposure. The real-time air quality monitoring system and the meteorological monitoring system allows the Responsible Person⁸ to review trigger alerts and then react if required.

⁸ Responsible Person definition see Appendix B.

SMS and email alerts are sent to the Responsible Person and the monitoring data is displayed in near real-time on an internal reporting system. Associated with each trigger is a response which informs measures taken by the Responsible Person.

System outputs currently include:

- daily forecast reports providing information on predicted temperature inversions, wind conditions and periods of dust risk;
- graphical representation of the forecast meteorology and the operational impact of the forecast meteorology e.g. dust plume figures;
- capability to analyse and confirm the likely source(s) of dust and the path(s) that the dust may travel; and
- automated alerts sent to the Responsible Person. These alerts are generated as SMS or email messages or by other systems integrated into operating processes.

5.5 Video Cameras

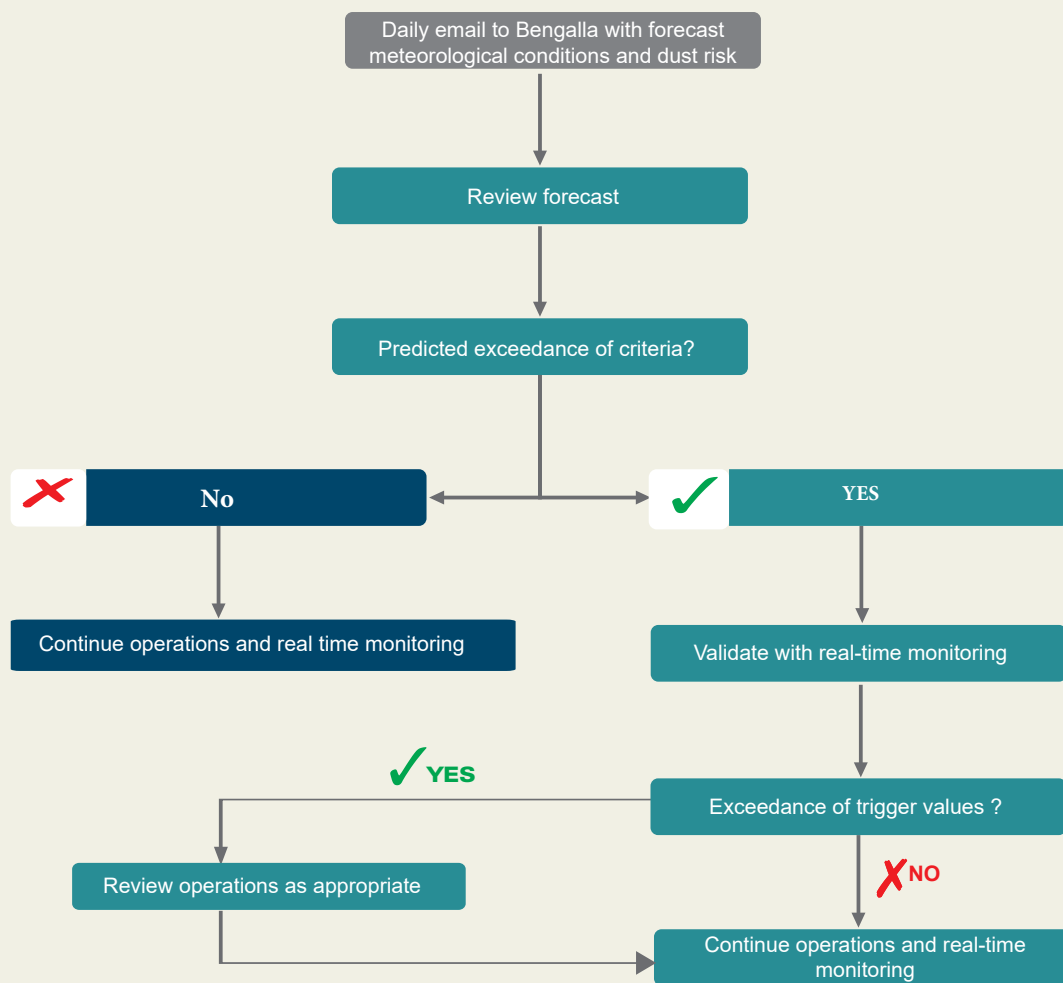
BMC operates video cameras to assist with monitoring and assessing the performance of the development. The cameras generally overlook Bengalla infrastructure, the mining area and haul roads to primarily allow for remote visualisation to support operational decision making. The purpose of the cameras is generally to:

- assist in making decisions to minimise off site air quality impacts;
- enhance mining operations decision making through improved situational awareness;
- improve emergency response capability;
- allow observation of some environmentally sensitive areas across the site; and
- site security.

5.6 Continuation of Predictive and Reactive Management System

The predictive and reactive management system described in this Section 5.0 is supplemented by an air quality monitoring network. Some air quality monitors are compliance monitors used to evaluate the performance of the development against the air quality criteria in SSD-5170 (as set out in Table 2) and some monitors are real-time monitors used as a management tool. The monitoring network is operated in accordance with the standards listed in Appendix A.

As described in Section 6.0 and Section 6.3 below, the existing air quality monitoring network will be replaced by a new air quality monitoring network. The elements of the predictive and reactive management system described in this Section 5.0 will continue to be used when the new air quality monitoring network is implemented, subject to the new air quality trigger levels described in Section 7.0.



BENGALLA MINE



Proactive Air Quality Management Procedure

FIGURE 4

6.0 AIR QUALITY MONITORING NETWORK

This section includes a description of the air quality monitoring network.

6.1 Existing Monitoring Network

The existing air quality monitoring network is shown in Figure 5 and Table 5 and comprises:

- one (1) meteorological station and an inversion tower;
- nine (9) High Volume Air Samplers (HVAS) with five measuring TSP and four measuring PM₁₀;
- six (6) real-time air quality monitors (four E-Bam monitors and two DustTrak monitors) linked to the Real Time Environmental Monitoring System (RTEMS); and
- 27 depositional dust gauges.

BMC currently relies upon the Upper Hunter air quality monitoring network managed by the EPA to record and monitor Particulate Matter less than 2.5 microns (PM_{2.5}) levels. The primary EPA monitor utilised by BMC is the Muswellbrook monitor, approximately 5 km to the east of Bengalla.

The monitors in the existing air quality monitoring network are described in further detail below. The existing air quality monitoring network will change upon approval of this AQMP and after the new air quality monitoring network is fully operational as described in Section 6.3 below.

6.1.1 Real Time Monitors

BMC's RTEMS air quality network provides monitoring data to assist in managing the day to day mining operations with consideration of weather parameters and recorded dust levels. BMC utilises four E-bam monitors and two DustTrak monitors which are linked to the RTEMS and provide continuous measurements of PM₁₀. These monitors have been installed to provide monitoring data (beyond that required to measure compliance with the air quality criteria) as a management tool.

6.1.2 High Volume Air Samplers

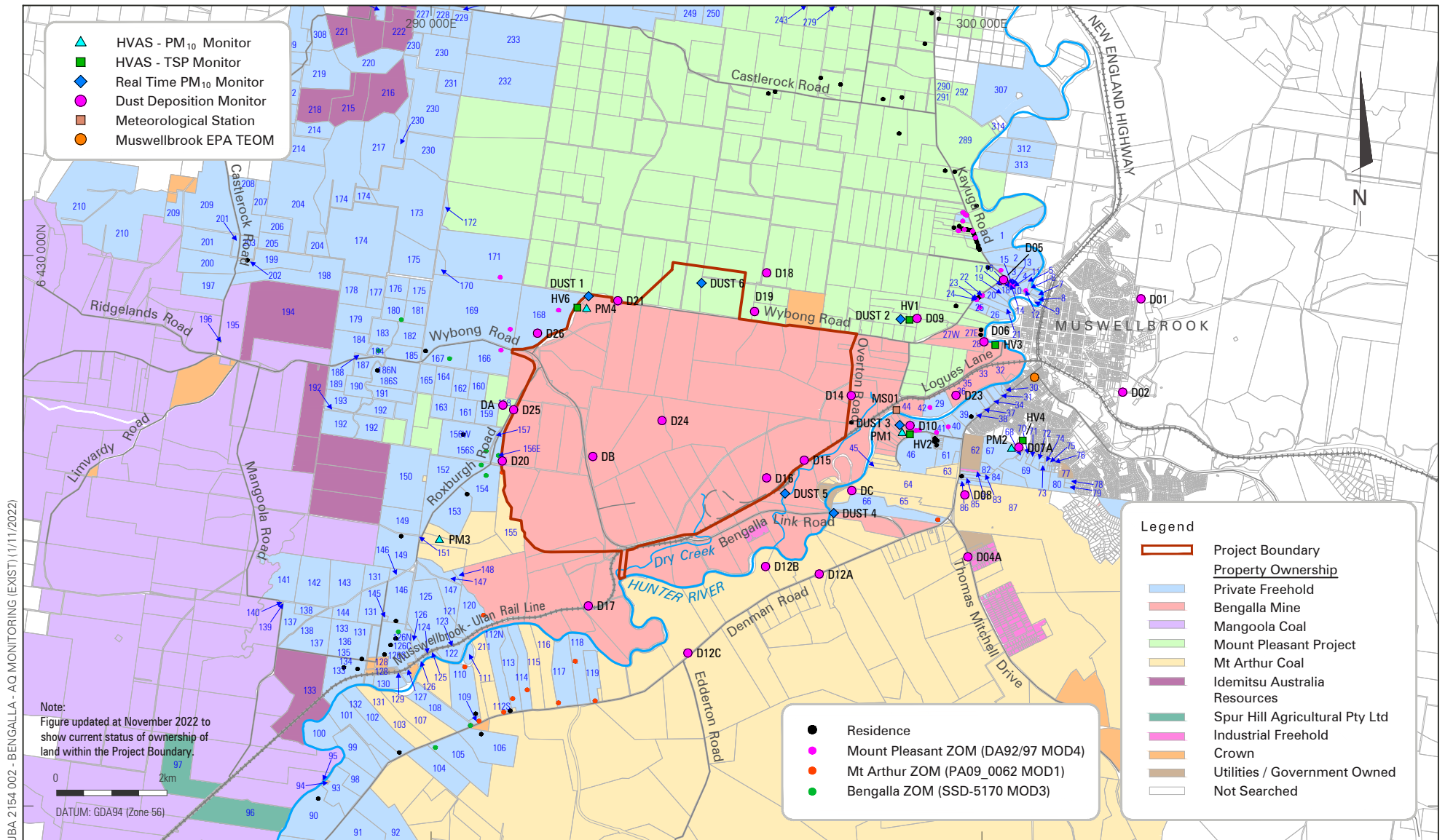
BMC operates five HVASs that monitor TSP and three that monitor PM₁₀ (BMC also receives data from PM₁₀-3 which is owned by MAC and monitors PM₁₀). Measurements are sampled every six days for a continuous 24-hour period. All HVAS monitors are currently used as compliance monitors.

6.1.3 Depositional Dust

BMC has 27 dust deposition gauges, some of which are situated on land generally representative of the nearest residence on privately owned land and are currently used to evaluate the performance of the development against the air quality criteria. The remaining gauges are located predominantly on mine owned land and are utilised for site management. Measurements at each gauge are sampled once per month.

Table 5
Existing Air Quality Monitoring Network

Aspect	Mechanism	Monitoring Location	Parameters Monitored
Meteorology	Meteorological station	Meteorological Station	Rainfall, temperature, temperature inversion, relative humidity, solar radiation, wind speed and wind direction
		Inversion Tower	
Air Quality	Depositional dust gauges	D01, D02, D04A, D05, D06, D07A, D08, D09, D10, D12A, D12B, D12C, D14, D15, D16, D17, D18, D19, D20, D21, D23, D24, D25, D26, DA, DB, DC	Depositional dust (g/m ² /month)
	Real Time	Dust 1 (E-Bam)	PM ₁₀
		Dust 2 (E-Bam)	
		Dust 3 (E-Bam)	
		Dust 4 (E-Bam)	
		Dust 5 (DustTrak)	
		Dust 6 (DustTrak)	
	HVAS	PM10-1, PM10-2, PM10-3, PM10-4	PM ₁₀
		HV1, HV2, HV3, HV4, HV6	TSP



BENGALLA PROJECT

Existing Air Quality Monitoring Network

FIGURE 5

6.2 Air Quality Monitoring Network Upgrade

The existing air quality monitoring network is to be replaced by a new air quality monitoring network which has been designed to reflect current air quality monitoring methods, the current and future position of Bengalla relative to residences on privately owned land that do not have an acquisition right for air quality and the commencement of MTP.

6.2.1 Process

The following process will apply to the transition from the existing air quality monitoring network to the new air quality monitoring network:

- 1) Decommission redundant monitors in the existing air quality monitoring network on approval of this AQMP ;
- 2) The remaining monitors will continue to operate until the new air quality monitoring network has been installed and is operational. This includes continued operation of the remaining compliance monitors in the existing network (that have not been decommissioned under (a) above) to evaluate the performance of the development against the air quality criteria in SSD-5170;
- 3) The new air quality monitoring network will be installed progressively. During the installation phase, some of the new air quality monitors will operate for testing purposes to enable establishment of air quality triggers; and
- 4) After the new air quality network is fully installed and operational (including the establishment of air quality triggers) the remaining parts of the existing air quality network will be decommissioned and the compliance monitors in the new air quality monitoring network will be used to evaluate the performance of the development against the air quality criteria in SSD-5170 (Changeover Date).

BMC will notify the DPE of the Changeover Date.

6.2.2 Decommissioning of Existing Monitors

Several dust deposition gauges and other air quality monitors are to be removed or will change from compliance monitors to real-time monitors (used for management purposes only) upon approval of this AQMP as set out below. This is because the monitors in question no longer fulfil their purpose due to the development of MTP adjacent to Bengalla and the current position of Bengalla relative to residences on privately owned land that do not have an acquisition right for air quality.

- monitors to be removed upon approval of AQMP - D01, D02, D04A, D05, D07A, D08, DC, D09, D12A, D12B, D12C, D14, D15, D16, D17, D18, D19, D20, D21, D23, D24, DA, DB, D25, HV1, Dust 2, Dust 5, Dust 6, HV4 and PM2.
- monitors to change status upon approval of AQMP - HV6 and PM10-4 change from compliance monitors to real-time monitors.

6.2.3 Interim Monitoring Network during Commissioning

The remaining monitors in the existing air quality monitoring network listed below will continue to be used until the new air quality network described in Section 6.3 is fully commissioned and operational:

- compliance monitors (used to evaluate the performance of the development against the air quality criteria in SSD-5170) – PM10-1 and PM10-3 for measuring PM10, HV2 and HV3 for measuring TSP and dust gauges D06, D10 and D26 for measuring deposited dust;
- and real time monitors (used for management purposes only) – Dust 1, Dust 3 and Dust 4.

6.3 New Air Quality Monitoring Network

The new air quality monitoring network will be installed, tested and commissioned generally in accordance with Table 7 and will replace the existing air quality monitoring network (including the EPA Muswellbrook monitor) in Section 6.1 when it has been fully commissioned (including setting trigger levels) and is operational.

6.3.1 Monitoring Network

The new air quality monitoring network is shown in Table 7 and Figure 6, with the monitors to be located generally within 500m of the nominated locations. Air quality monitoring will be undertaken in accordance with the relevant Australian Standards and legislation and the EPA's *"Approved Methods for the Sampling and Analysis of Air Pollutants in New South Wales"* (DEC, 2007).

The air quality monitoring network will consist of TSP, PM10 and PM2.5 concentration monitors, dust deposition gauges, and a meteorological station near the mine and at locations representative of the nearest sensitive receptors. The new monitoring network will consist of:

- the current meteorological station and inversion tower;⁹
- eight Tapered Element Oscillating Microbalance (TEOMs) (or other suitable monitor) continuously measuring PM₁₀;
- two TEOMs continuously measuring PM_{2.5};
- five HVAS measuring TSP; and
- five depositional dust gauges.

Some of these monitors are for compliance purposes (to evaluate the performance of the development against the air quality criteria in SSD-5170) and some are real-time monitors (used as a management tool) as set out in Table 7.

⁹ In accordance with Schedule 3, Condition 21 of SSD-5170, BMC will ensure that a suitable meteorological station operates in the vicinity of the site during the life of the development that complies with the requirements in the Approved Methods for Sampling of Air Pollutants in New South Wales (DEC 2007) guideline and is capable of continuous real-time measurement of temperature lapse rate in accordance with the NSW Noise Policy for Industry, unless a suitable alternative is approved by the Secretary following consultation with the EPA.

Continuous Environmental Monitoring Units

The network will include a series of real time continuous monitoring units. The monitoring units are designed to operate continuously and will be used to assess operations on a real time basis. Real time monitoring data can be accessed by site personnel to determine real time air quality conditions or can be used to perform historical searches to respond to complaints or issues.

Each real time air quality monitoring unit is fitted with alert capabilities that can advise relevant mining personnel that air quality at the monitor has reached a pre-set value. Alerts are sent to the environment personnel and the Responsible Person to warn that air quality is reaching the predetermined limit as described in Section 7.0. Relevant controls can then be implemented to modify operations where it is deemed necessary to maintain operational compliance.

While these units are designed to operate continuously, some outages may occasionally occur which are outside BMC control for example network connectivity outages, power supply issues, maintenance tasks and breakdowns. All units are maintained in accordance with relevant Australian Standards.

High Volume Air Samplers (HVAS)

The HVAS are sampled once every six days for a continuous 24-hour period. The air is passed through a filter system to determine the amount of TSP and PM10 dust is contained in the air. The samples are collected after running for a period of 24 hours and analysed, with the results assessed against the relevant criteria.

Depositional Dust Gauges

Dust Deposition Gauges (DDG's) are a series of bottle and funnel based gauges. The dust gauges are sampled once a month to determine the amount of dust that settles in a predetermined area. This is then analysed for contamination through insects, bird droppings etc. with the non-contaminated results assessed against the criteria.

Northern Monitor

A real time continuous monitor will be installed on the northern boundary between Bengalla and MTP. There will not be any trigger levels associated with this location as it is situated directly between two mining operations in close proximity to infrastructure, for example, the MTP coal handling and preparation plant area, conveyor and roads network, and a significant distance from any private receivers where air quality criteria is applicable. The purpose of the monitor is to provide an additional tool to understand background air quality and surrounding dust sources. The monitor may be used during investigation of dust events to assist in identifying the potential source(s) and scale of air quality impacts on private receivers.

6.3.2 Implementation Plan

Following approval of this AQMP, BMC will commence the implementation of the new air quality monitoring network. It is anticipated that each monitor (shown in Figure 6) will be commissioned as per Table 6 below.

Table 6
Implementation Schedule

Monitoring Site	No. of Weeks from Approval
AQ1	25
AQ2	25
AQ3	35
AQ4	35
AQ5	TBA
AQ6	TBA
AQ7	TBA
AQ8	TBA

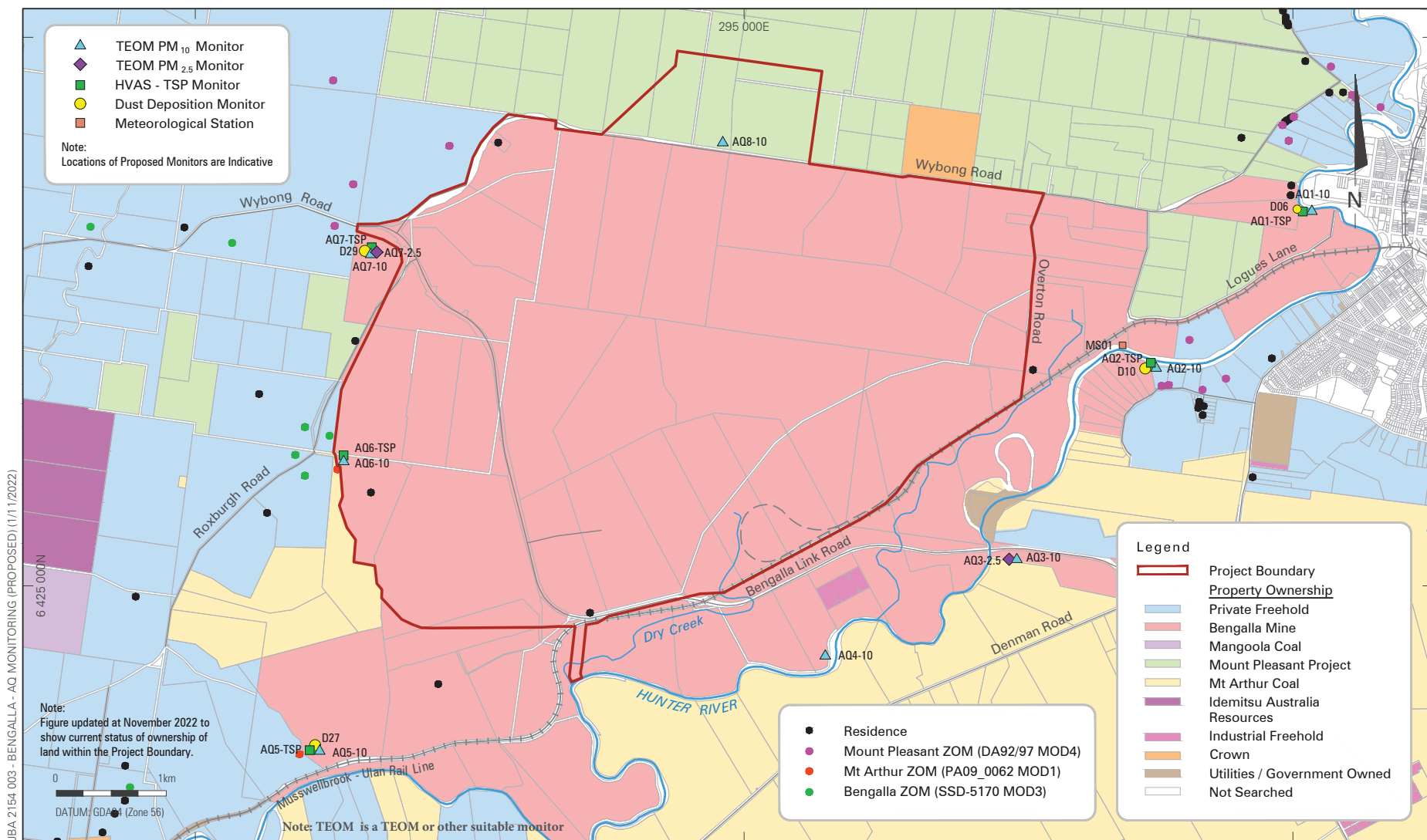
Note:

1. *Implementation schedule is approximate only and is subject to change due to delivery time of monitors and mains power supply to monitor site (involving approvals from electrical utilities, delivery time of electrical infrastructure and access to certain private land).*

During the installation phase of the new air quality monitoring network, a period of testing is required to establish trigger levels. After trigger levels have been established for all required monitors then:

- the new air quality network will be fully commissioned (the Changeover Date);
- from the Changeover Date:
 - the compliance monitors in the new air quality monitoring network (refer to Table 7) will be used to evaluate the performance of the development against the air quality criteria in SSD-5170; and
 - the real-time monitors in the new air quality monitoring network (refer to Table 7) will be used as a management tool;
- the remainder of the existing air quality monitoring system described in Section 5.0 will be decommissioned; and
- the trigger levels will be reviewed from time to time as noted in Table 8 or as necessary.

BMC will notify the DPE of the Changeover Date. BMC will also update this AQMP once implementation of the new air quality monitoring network is complete and provide a copy to DPE.



BENGALLA PROJECT

Proposed Air Quality Monitoring Network

FIGURE 6

Table 7
New Air Quality Monitoring Network

Aspect	Mechanism	Monitoring Location	Parameters Monitored
Meteorology	Meteorological station	Meteorological Station	Rainfall, temperature, temperature inversion, relative humidity, solar radiation, evapotranspiration, wind speed and wind direction
		Inversion Tower	
Air Quality	Depositional dust gauges	D06 (compliance), D27 (compliance), D10 (compliance), D29 (compliance)	Depositional dust (g/m ² /month)
	Total Suspended Particulate (TSP)	AQ1-TSP (compliance), AQ2-TSP (compliance), AQ5-TSP (compliance), AQ6-TSP (real time), AQ7-TSP (compliance)	TSP
	PM ₁₀ and PM _{2.5}	Real time monitors PM ₁₀ : AQ1-10 (compliance), AQ2-10 (compliance), AQ3-10 (real time), AQ4-10 (real time), AQ5-10 (compliance), AQ6-10 (real time), AQ7-10 (compliance) Real time monitors PM _{2.5} : AQ3-2.5 (real time), AQ7-2.5 (compliance)	PM ₁₀ , PM _{2.5}

7.0 TRIGGER ACTION RESPONSE PLAN

This section includes a description of the predictive and reactive air quality management process and Trigger Action Response Plan implemented at Bengalla to control operational impacts to air quality.

7.1 Air Quality Response Process

As described in Section 5.0 the predictive and reactive air quality management system allows BMC personnel to assess potential offsite air quality impacts against forecast conditions and inform operations based on outputs of the system. The predictive and reactive air quality management system at Bengalla includes:

- a daily forecast report using weather forecasts and dispersion modelling;
- real-time meteorological and air quality monitoring data; and
- implementation of trigger levels for managing potential offsite impacts.

In accordance with SSD-5170 BMC implements air quality control measures where reasonable and feasible. The process for responding to proactive air quality management procedure based on forecast conditions and real time monitoring (having regard for trigger values) is outlined in Figure 7.

Upon the receipt of a Level 1 Amber Alert, the Responsible Person will use one, or all, of the following measures to determine whether the Bengalla operation should be modified:

- the Responsible Person may view any relevant monitoring camera and arrange for any necessary observation from the Site and/or relevant real time air quality monitoring location of existing mining activities to ascertain whether the Level 1 Amber Alert is due to Bengalla or other sources.
- with this information, a decision will be made as to whether aspects of the Bengalla operation should be modified.
- if it is determined the Bengalla operation is to be modified, then measures will be taken to identify what change is needed and how that should occur. This process may include inspections of relevant areas where mining activities are to occur (e.g. tip faces, alternate haul road(s), etc.).
- after determining how the Bengalla operation will be modified processes will be enacted to modify the Bengalla operation.

The response to a Level 2 Red Alert includes the measures identified in Table 3 and measures identified in a Level 1 Amber Alert and the Level 2 Red Alert measures identified in Table 8.

Any required material change to the operations in response to a Level 1 Amber Alert or a Level 2 Red Alert is generally to be put in place within 75 minutes after receipt of a Level 1 Amber Alert or Level 2 Red Alert.

PREDICTIVE

Forecast Report: Daily predictive forecast meteorology and dust risk prediction provided to Environmental personnel and Responsible Person.

Review: Determine potential offsite air quality impacts against forecast conditions

Plan: Daily operations

CONTROLS: Responsible Person implements control measure (**Table 3**)

REACTIVE

STANDARD CONTROLS: Air quality standard control measures **Table 3**

Real Time Meteorological and Air Quality Monitoring

SMS and email alert - Level 1 Amber Alert received by Responsible Person

Implement TARP (Table 8) – Level 1 alert measures by Responsible Person

SMS and email alert - Level 2 Red Alert received by Responsible Person

Implement TARP (Table 8) – Level 2 red alert measures by Responsible Person

7.2 Air Quality Triggers

As described above (Section 6.3.2), a period of testing is required to refine the trigger levels during the installation phase of the new air quality monitoring network. From approval of this AQMP until the new air quality network is fully commissioned and operating (the Changeover Date), the 1-hour wind speed trigger and associated responses in Table 8 below will apply. From the Changeover Date, all triggers and associated responses in Table 8 will apply. Further background information about how the triggers are determined is set out below.

The triggers are to be based on the real time dust levels, wind direction and speed as recorded at the relevant air quality monitor. Trigger levels for each monitor will be refined based on the most recent air quality modelling predictions and the location of each of the real-time monitors. The determined trigger levels will be reviewed and may be modified from time to time following future air quality reviews.

The triggers will be set to identify Level 1 Amber Alerts and Level 2 Red Alerts at compliance monitors so that particulate emissions generated by the development do not exceed the air quality criteria at any residence on privately-owned land that does not have an acquisition right for air quality. Table 8 identifies the measures to be taken in response to a Level 1 Amber Alert and a Level 2 Red Alert.

7.3 Meteorological Triggers

It is well established that the onset of wind erosion, (i.e. where the passing wind just begins to be able to move particles at ground level), commences when the one-hour average wind speed measured at 10m height above ground level reaches a speed of approximately 5 to 6 m/s. As the wind speed progressively increases above 6m/s, the quantity of dust generated by wind erosion progressively increases (approximately proportional to a cubic power of the wind speed).

For sites with significant freshly exposed/disturbed areas covered in loose, fine, dry dust, there can be noticeable dust lift off at approximately 8m/s. This is more so for elevated areas, where the surface wind tends to be a little higher than the lower or in-pit areas. For this reason, a one-hour measured wind speed of 8m/s at 10 m height (as measured at the Bengalla Meteorological Station or the 10 m Anemometer on the Bengalla Inversion Tower if the Bengalla Meteorological Station is not operating) has been selected.

7.4 Trigger Action Response Plan

Table 8
Trigger Action Response Plan

Level	Level 0 - Green	Level 1 – Amber	Level 2 – Red
Initial Dust Trigger Levels	No Alert	1-hour alert Development alone PM10 1-hour concentration is above the monitor trigger of 150 µg/m ³ for three consecutive hours at compliance monitors.	Rolling 24-hour Development alone PM10 concentration is above the monitor trigger of 75 µg/m ³ for six consecutive hours at compliance monitors.
Meteorological Trigger levels*	No Alert	Level 1 - Monitor Alert 1-hour measured average wind speed exceeds 8 m/s and is less than 10m/s and wind direction is from 240o to 305o.	Level 2 –Alert 1-hour measured average wind speed is above 10m/s and wind direction is from 240o to 305o.
Response	Measures outlined in Table 3	Following receipt of a Level 1 Amber Alert the Responsible Person in addition to the measures in Table 3 should: - Identify the monitor where the trigger is occurring. - Determine if possible whether the cause of the trigger alert is due to other sources or Bengalla. - Conduct visual inspections as required. - No operation on the elevated and exposed areas of the OEA. - No operation on the elevated and exposed areas of the Pre-strip. - Coal stockpile spray systems activated. - Cessation of topsoil stripping activities.	Following receipt of a Level 2 Red Alert the Responsible Person in addition to the measures in Table 3 and the Level 1 Amber Alert should cease all dust generating activities on Site until a Level 1 Amber Alert is received.



Level	Level 0 - Green	Level 1 – Amber	Level 2 – Red
	Ancillary Activities may continue in Green, Amber and Red conditions. Ancillary Activities include the operation of: - the Coal Handling Preparation Plant and associated activities, for example, loading/unloading and transportation of ROM coal and reject materials; and - light vehicles, water carts, loading/unloading desilt trucks and transportation of desilt materials, blasting and exploration drilling.		

Note:

- Wind speed is measured at the Bengalla Meteorological Station or the 10 m Anemometer on the Bengalla Inversion Tower (if the Bengalla Meteorological Station is not operating) and wind direction is measured at the Bengalla Meteorological Station.*
- Triggers and vectors will be reviewed as described below, and as required:*
 - each quarter for the first year;*
 - every 6 months for the second year; and*
 - annually for the third year and onwards.*
- As described above, the 1-hour wind speed trigger applies from approval of this AQMP. The remaining triggers will apply from the Changeover Date.*

8.0 GREENHOUSE GAS AND ODOUR CONTROL

This section includes greenhouse gas sources, odour sources and management measures.

8.1 Greenhouse Gas Sources

MOD 4 requires BMC to implement reasonable and feasible measures to minimise the release of greenhouse gas (GHG) emissions from Bengalla. The main sources of onsite GHG emissions from Bengalla result from diesel usage, explosives usage, electricity consumption and fugitive emissions of carbon dioxide and methane.

Carbon dioxide and methane naturally occur in coal seams and are released to the atmosphere during the mining process. By moving material efficiently, energy use is reduced, along with GHG emissions.

8.2 Greenhouse Gas Management

Mitigation and management measures that will be implemented to minimise GHG emissions include:

- the use of fuel-efficient machinery, for example, haul trucks, excavators etc;
- optimising fleet operations, for example, design of haul roads, ramp gradients and distance of haul to enable efficient fuel use;
- the use of efficient electric motors;
- the use of energy efficient lighting systems; and
- the development of operational plans to optimise the recovery of the coal resource.

8.3 Greenhouse Gas Reporting

After each Financial Year BMC reports on the emissions of certain substances to the National Pollutant Inventory (NPI). GHG emissions, energy consumption and production data are also reported under the National Greenhouse and Energy Reporting (NGER) Scheme.

8.4 Odour Sources

The primary potential source of odour at Bengalla is spontaneous combustion. Occurrences of spontaneous combustion are historically rare at Bengalla due to the inert nature of the strata and proactive stockpile management.

Blasting is another potential source of odour. BMC conducts blasting in accordance with the approved Blast Management Plan and any fume from a blast is assessed relevant to the Post Blast Fume Generation Mitigation and Management Plan.

8.5 Odour Management

Management of combustion materials usually includes either:

- extracting the combustion materials from their insitu location and then covering the combustion materials until combustion ceases. The materials are then generally rehandled into the OEA; or
- covering the combustion materials insitu if the combustion materials are in a suitable location.

9.0 LANDHOLDER NOTIFICATIONS, MITIGATION & ACQUISITION

This section provides details on landholder notifications, mitigation and acquisition.

9.1 Notifications to Landholders and Tenants

Under Schedule 4, Condition 1 of SSD-5170 BMC was required to notify landowners and tenants of their mitigation or acquisition rights by 4 April 2015. The required notifications were undertaken by BMC on 2 April 2015, with letters provided to 20 landholders and/or tenants located within 3 km of the approved open cut.

All notifications included a copy of the NSW Health fact sheet entitled “Mine Dust and You” (dated April 2011) where EIS predictions identified dust emissions generated by Bengalla were likely to be greater than relevant air quality criteria at any time in the life of Bengalla.

9.2 Future Tenancy Agreements

In accordance with Schedule 4, Condition 2 of SSD-5170 BMC will do the following prior to entering into any tenancy agreement for any BMC owned land that is predicted to experience exceedances of the air quality criteria:

- advise the prospective tenants of the potential health and amenity impacts associated with living on the land and give them a copy of the NSW Health fact sheet entitled “Mine Dust and You” (as may be updated from time to time); and
- advise the prospective tenants of the rights they would have under SSD-5170.

In accordance with Schedule 3, Condition 18 of SSD-5170, BMC must ensure that all reasonable and feasible avoidance and mitigation measures are employed so that the dust emissions generated by Bengalla do not cause exceedances of the relevant air quality criteria at any occupied residence on mine-owned land (including land owned by another mining company) unless certain measures are taken. These measures include notifying the tenant/landowner of the health risks associated with such exceedances, allowing the tenant to terminate the agreement without penalty at any time (subject to reasonable notice) and regularly undertaking monitoring to inform the tenant/landowner of the actual dust emissions at the residence and presenting the data to the tenant/landowner in an appropriate format to assist in making informed decisions on the health risks.

9.3 Acquisition Upon Request

Upon receipt of a written request for acquisition from a landowner with acquisition rights, BMC will follow the procedures in Schedule 4, Conditions 5 and 6 of SSD-5170 to acquire any property stipulated in:

- Schedule 3, Condition 1 of SSD-5170; or
- Schedule 3, Condition 2 of SSD-5170, but only if that land is no longer subject to acquisition upon request under a relevant development consent for MAC or MTP as set out in SSD-5170 Table 2.

In accordance with Schedule 4, Condition 5 of SSD-5170, a written offer will be made within 3 months of receiving a request for acquisition.

9.4 Mitigation upon Request

Upon receiving a written request from the owner of any residence on the land listed in SSD-5170 Table 1 (unless the landowner of that land has requested acquisition), SSD-5170 Table 2 (if acquisition or mitigation by the mine listed in Table 2 is no longer available to the landowner of that land) and on the land listed in SSD-5170 Table 3, BMC will implement additional mitigation measures.

In consultation with the owner of the residence, BMC may implement air quality mitigation measures (such as air filters, a first flush roof water drainage system and/or air conditioning).

These measures must be reasonable and feasible and directed towards reducing the air quality impacts of Bengalla on that residence.

BMC will also be responsible for the reasonable costs of ongoing maintenance of these additional mitigation measures subject to agreement with the owner until the cessation of mining operations.

If within three months of receiving a request for mitigation from the owner, BMC and the owner cannot agree on the measures to be implemented, or there is a dispute about the implementation of these measures, then either party may refer the matter to the Secretary for resolution.

9.5 Notifications of Exceedances to Landowners

Where exceedance of relevant air quality criteria in Schedule 3, Condition 16 occurs, notification will occur as soon as practicable in accordance with Schedule 4, Condition 3 of SSD-5170 generally as described below:

- BMC will notify the affected landowners in writing of the exceedance, and provide regular updates to these landowners until Bengalla is again complying with the relevant criteria; and
- BMC will send a copy of the NSW Health fact sheet entitled "Mine Dust and You" (latest version) to the affected landowners and/or existing tenants of the land (including the tenants of any mine-owned land).

9.6 Independent Review

If an owner of privately-owned land considers Bengalla to be exceeding the relevant criteria in SSD-5170 Schedule 3, Condition 16, they may ask the Secretary of the DPE in writing for an independent review of the impacts of the development on their land.

Upon instruction from the DPE, BMC will progress this review in accordance with Schedule 4, Condition 4 of SSD-5170 which generally includes the following:

- appoint a suitably qualified, experienced and independent person to undertake the review;
- obtain the Secretary's approval of the appointment;
- provide the Secretary and the landowner with a copy of the independent review, as well as a plan outlining BMC's proposed response to the recommendations of the independent review; and
- implement the necessary measures as directed by the Secretary.

10.0 REPORTING & AUDITING

This section provides a summary of reporting and auditing requirements.

10.1 Annual Review

In accordance with Schedule 5, Condition 4 of SSD-5170 by the end of March each year, BMC will provide an Annual Review to the Secretary of DPE, which will review the environmental performance of the mine for the previous calendar year. The Annual Review will include:

- the presentation and analysis of the air quality monitoring results against the relevant performance measures and criteria;
- comparison of monitoring trends against results from previous years and the predicted impacts associated with Bengalla; and
- review of any complaints related to air quality management at Bengalla.

Following review of air quality monitoring results and operational performance, BMC will determine if there are any additional measures required to improve air quality performance at Bengalla. The Annual Review will be made publicly available through placement on BMC's website and will be provided to the Community Consultative Committee.

10.2 Auditing

Within one year of the commencement of development (commencement 1 October 2015) under SSD-5170 and every three years thereafter, unless the Secretary directs otherwise, BMC will commission and pay the full cost of an Independent Environmental Audit of Bengalla.

In accordance with Schedule 5, Condition 9 of SSD-5170, the audit will:

- (a) "be conducted by a suitably qualified, experienced and independent team of experts whose appointment has been endorsed by the Secretary;*
- (b) include consultation with the relevant agencies and CCC;*
- (c) assess the environmental performance of the development and assess whether it is complying with the requirements in this consent and any relevant EPL or Mining Lease (including any assessment, plan or program required under these approvals);*
- (d) review the adequacy of strategies, plans or programs required under the abovementioned approvals; and*
- (e) recommend appropriate measures or actions to improve the environmental performance of the development, and/or any assessment, plan or program required under the abovementioned approvals."*

This audit will consider Bengalla's performance in relation to air quality management. In accordance with Schedule 5, Condition 10 of SSD-5170, BMC will submit the audit report and its response to the audit report within 6 weeks of its completion (unless the Secretary agrees otherwise).

10.3 Plan Review

Schedule 5, Condition 5 of SSD-5170 requires that within three months of the submission of the following documents, BMC will review, and if necessary, revise the AQMP in consultation with the EPA and MSC to the satisfaction of the Secretary of DPE:

- Annual Review in accordance with Schedule 5, Condition 4;
- Incident report under Schedule 5, Condition 7;
- Audit report under Schedule 5, Condition 9; or
- modification to the conditions of SSD-5170 (unless the conditions require otherwise).

When a BMC review leads to revision in the AQMP, then within four weeks of the review decision, unless the Secretary agrees otherwise, the revised AQMP will be submitted to the Secretary for approval.

10.4 Reporting an Exceedance

Schedule 5, Condition 3 of SSD-5170 requires BMC to prepare a protocol to manage and report exceedances of the air quality impact assessment criteria to the relevant regulatory agencies.

10.4.1 Protocol for Determining Exceedances

Where monitoring results are below the levels indicated by SSD-5170 Schedule 3 Condition 16 (the air quality criteria) at compliance monitors, no further action is required.

Where monitoring results are above the air quality criteria at compliance monitors, an examination of the circumstances of and environmental and operational conditions prevailing at the time of such monitoring results will be undertaken by BMC environment personnel (utilising an appropriately qualified and experienced expert(s) where necessary).

Any exceedances are recorded.

10.4.2 Responding to an Exceedance

In accordance with Schedule 5, Condition 2 of SSD-5170, BMC will implement the following adaptive management strategy if an exceedance of the criteria (Schedule 3 Condition 16) and/or the operating conditions (Schedule 3 Condition 19) both addressed within this AQMP occurs. BMC will:

- take all reasonable and feasible steps to ensure that the exceedance ceases and does not recur;
- consider all reasonable and feasible options for remediation (where relevant) and submit a report to the Department describing those options and any preferred remediation measures or other courses of action; and
- implement remediation measures as directed by the Secretary.

Following implementation of any remedial measures BMC will review this AQMP to determine if this AQMP requires amendment.

10.4.3 Landholders and Tenants

Following confirmation of an exceedance, notification of landholders and tenants will occur as described in Section 9.5.

10.5 Reporting an Incident or Non-Compliance

In accordance with Schedule 5, Conditions 7 and 7A of SSD-5170 BMC are required to report any Incidents¹⁰ or Non-compliances¹¹.

After becoming aware of an Incident the Bengalla Environment Superintendent or delegate will immediately report any Incident to DPE and any other relevant agencies.

Within seven days of becoming aware of a Non-compliance the Environment Superintendent or delegate will provide a written report to DPE and any other relevant government agencies. The report will include the following details:

- The development application number and name;
- The condition of this consent that the development is non-compliant with;
- The non-compliance details (date, time and nature of the non-compliance)
- The likely cause of the non-compliance (if known); and
- Description of actions that have been, or are proposed to be implemented to address the Non-compliance.

Note: A Non-compliance which has been notified as an incident does not need to also be notified as a Non-compliance

10.6 Complaints

BMC will at least record the following details:

- complainant details (where provided);
- the nature of the complaint;
- how the complaint was made;
- actions (if appropriate); and
- consultation undertaken.

¹⁰ Incident definition see Appendix B.

¹¹ Non-compliance definition see Appendix B.

Complaints and enquiries regarding air quality issues and any other environmental matters are directed to the 24-hour complaints hotline: 1800 178 984.

Complaints will be published monthly on BMC's website in accordance with SSD-5170 Schedule 5, Condition 11(a).

10.7 Continuous Improvement

Environmental performance of the Bengalla in relation to air quality impacts is continuously evaluated through:

- review and investigation of any exceedances;
- Independent environmental audits;
- feedback from stakeholder consultation or complaints; and
- Annual Review process.

Air quality monitoring results are reviewed continuously as part of the ongoing reporting requirements including:

- monthly as part of the State Significant Development 5170 Monthly Monitoring Data Summary and the Environment Protection Licence 6538 Monthly Monitoring Data Summary; and
- in the Annual Review which compares air quality monitoring results for that year against the relevant air quality criteria.

Those air quality monitoring results are assessed relative to the air quality impact assessment modelling predictions.

Non-compliances regarding air quality are reported in the Annual Review. Following submission of the Annual Review to the DPE and the DPE responding to the Annual Review, BMC will determine if any change to dust management practices at Bengalla is required.

10.8 Public Access to Information

In accordance with Schedule 5, Conditions 8 and 11 of SSD-5170, BMC will regularly (in the form of the Annual Review) prepare a summary of air quality monitoring results required by SSD-5170 and make these publicly available on the BMC website.

This AQMP will be made publicly available on the BMC website. As described at Section 10.6 above, complaints are also published on the BMC website.

10.9 Contingency Plan

A contingency plan outlines procedure(s) for responding to unpredicted impacts. BMC has developed alerts and responses based on more than 20 years of operational experience. These systems have proven to be effective at managing air quality risks that may arise during mining operations.

Notwithstanding, the following contingency plan will be implemented if any unpredicted impacts occur which are inconsistent with Condition 16 of Schedule 3 of SSD-5170:

- BMC will commission as required a suitably qualified and experienced expert to investigate the cause of the unpredicted impact;
- if the investigation determines that Bengalla is a material cause of the impact, BMC will notify the DPE of the impact;
- BMC will investigate the impact and any reasonable and feasible response actions to be implemented; and
- if necessary, this AQMP will be updated to include the response actions.

11.0 RESPONSIBILITIES

Table 9 provides a summary of responsibilities. Responsibilities may be delegated as required.

Table 9
Responsibilities Summary

Ref	Task	Responsibility	Timing
1	Provide adequate resources to implement the commitments in this AQMP.	BMC General Manager	Ongoing
2	Provide training to the Responsible Person in accordance with this AQMP.	BMC Environment Superintendent	Ongoing
3	Maintain the air quality monitoring program as described in Section 5.0, 6.0 and 6.3.	BMC Environment Superintendent	Ongoing
4	Implement operational air quality management measures as described in Table 3 and Table 8.	BMC Mining Manager	Ongoing
5	Monitor and report greenhouse gas emissions in accordance with Section 8.0.	BMC Environment Superintendent	Ongoing
6	Provide notification in accordance with Section 9.0.	BMC Environment Superintendent	Ongoing
7	Undertake auditing and reporting (including complaints, exceedances and incidents) per Section 10.0.	BMC Environment Superintendent	As required

12.0 REFERENCES

- Bengalla Mining Company Pty Limited (2013), Environmental Impact Statement titled *Continuation of Bengalla Mine, Environmental Impact Statement* (6 volumes), dated September 2013, as modified by the *Response to Submissions* dated March 2014.
- Hansen Bailey (2015), Statement of Environmental Effects titled '*Bengalla Mine Development Consent Modification Statement of Environmental Effects*' dated August 2015 and prepared by Hansen Bailey, including the *Response to Submissions* document dated October 2015.
- Hansen Bailey (2016), Statement of Environmental Effects titled '*Bengalla Mine Development Consent Modification Statement of Environmental Effects*' dated April 2016 and prepared by Hansen Bailey, including the *Response to Submissions* document dated June 2016.
- Hansen Bailey (2016), Statement of Environmental Effects titled '*Bengalla Mine Development Consent Modification 3 Statement of Environmental Effects*' dated September 2016 and prepared by Hansen Bailey, including the *Response to Submissions* document dated November 2016.
- Hansen Bailey (2017), Statement of Environmental Effects titled '*Bengalla Mine Development Consent Modification 4 Statement of Environmental Effects*' dated December 2017 and prepared by Hansen Bailey, including the *Response to Submissions* document dated May 2018 and additional information dated July 2018 and November 2018.
- James Bailey Associates (2021), *Bengalla Mine Development Consent SSD-5170 Modification 5 Modification Report* dated November 2021 and prepared by James Bailey Associates, including the *Modification 5 Submissions Response* dated July 2022.
- Katestone Environmental (2010), *NSW Coal Benchmarking Study: International Best Practice Measures to Prevent and/or Minimise Emissions of Particulate Matter from Coal Mining*.

APPENDIX A
AIR QUALITY MONITORING STANDARDS

Relevant Air Quality Monitoring Standards

Parameter	Standard
General	NSW EPA “Approved methods for the sampling and analysis of air pollutants in NSW” (2007). • AM-1 – Guide for the siting of sampling units. • AM-2 – Guide for measurement of horizontal wind for air quality applications. • AM-18 - Particulate matter – PM₁₀ – HVAS. • AM-19 – Particulates – deposited matter – gravimetric method. • AM-22 – Particulate matter – PM₁₀ – TEOM.
Siting	AM-1 Australian Standard (AS) 2922-1987, superseded by Australian Standard (AS/NZS) 3580.1.1:2016 “Methods for sampling and analysis of ambient air – Guide to siting air monitoring equipment”
Meteorological Monitoring	AM-2 AS AS2923-1987: Ambient air - Guide for measurement of horizontal wind for air quality applications AM-4 USEPA (2000) - Meteorological Monitoring Guidance for Regulatory Modelling Applications (EPA 454/R-99-005)
PM ₁₀	AM-22 AS/NZS 3580.9.8 – 2008 Methods for sampling and analysis of ambient air – Method 9.8 Determination of suspended particulate matter – PM₁₀ continuous direct mass method using a tapered element oscillating microbalance analyser. AM-18 AS/NZS 3580.9.6:2003, superseded by AS/NZS 3580.9.6-2015: Methods for sampling and analysis of ambient air –determination of suspended particulate Matter – PM₁₀ - high volume air sampler with size selective inlet – gravimetric method.
PM _{2.5}	No applicable approved method – to be conducted in general accordance with AM-22
Dust Deposition	AM-19 AS/NZS 3580.10.1:2003, superseded by AS/NZS 3580.10.1-2016: Methods for sampling and analysis of ambient air - Determination of particulate matter - Deposited matter - Gravimetric method.

APPENDIX B

TERMS & ABBREVIATIONS

Terms and Abbreviations

Abbreviation	Description
Air Quality Criteria	As stipulated in Condition 16 of Schedule 3 of SSD-5170.
°C	Degrees Celsius
g	Grams
DDG	Dust Deposition Gauge
Development	The development described in the documents in condition 2(a) of Schedule 2 of SSD-5170.
Feasible	Means what is possible and practicable in the circumstances.
Incident	An occurrence or set of circumstances that causes or threatens to cause material harm and which may or may not be or cause a non-compliance.
km/h	Kilometres travelled per hour
m	Meters
m ²	Square meters
mm	Millimetres
m/s	Meters travelled per second
Material Harm	Is harm that involves actual or potential harm to the health or safety of human beings or to the environment that is not trivial, or results in actual or potential loss or property damage of an amount, or amounts in aggregate, exceeding \$10,000, (such loss includes the reasonable costs and expenses that would be incurred in taking all reasonable and practicable measures to prevent, mitigate or make good harm to the environment). This definition excludes "harm" that is authorised under SSD-5170 or any other statutory approval.
Non-compliance	An occurrence, set of circumstances or development that is a breach of SSD-5170.
Operating Conditions	Condition 19 of Schedule 3 of SSD-5170.
PM	Particulate Matter
PM _{2.5}	Particulate matter with equivalent aerodynamic diameter of 2.5 microns or less
PM ₁₀	Particulate matter with equivalent aerodynamic diameter of 10 microns or less
Pre-strip	Pre-strip is the first pass cut to natural surface.
Reasonable	Reasonable relates to the application of judgement in arriving at a decision, taking into account: mitigation benefits, cost of mitigation versus benefits provided, community views and the nature and extent of potential improvements.



Abbreviation	Description
Responsible Person	BMC personnel such as the Mining Superintendent, Open Cut Examiner, CHPP Superintendent and others that have the responsibility for acting upon receipt of a Level 1 Amber Alert and a Level 2 Red Alert in accordance with this AQMP.
Privately-owned land	Land that is not owned by a public agency or a mining company (or its subsidiary)
Site	The land listed in Appendix 1 of SSD-5170.
T	Tonne
TEOM	Tapered Element Oscillation Microbalance
TSP	Total Suspended Particulate matter
µg	Micrograms

APPENDIX C
REGULATORY CORRESPONDENCE



***Section intentionally left blank to include
regulatory correspondence on draft AQMP***

APPENDIX D

BASELINE DATA

BASELINE AIR QUALITY DATA

The annual average air quality monitoring results for deposited dust, TSP and PM10 are assessed against the relevant criteria over a three year period in the annual review. During the 2019 – 2021 period the cumulative measurements have generally decreased over the three-year period. The decrease may be attributed to increased rainfall in 2020 and 2021 compared to drought conditions which were experienced throughout 2019. These baseline data results are included in the tables below.

Summary of Deposited Dust Annual Average Monitoring Results

Site	Annual Average Deposited Dust Criteria (g/m ² /month)	2021 Annual Average Deposited Dust (g/m ² /month)	2020 Annual Average Deposited Dust (g/m ² /month)	2019 Annual Average Deposited Dust (g/m ² /month)
D01	4.0	0.9	1.2	1.6
D02	4.0	1.2	2.4	1.9
D04A	4.0	2.1	3.0	2.7
D05	4.0	2.1	2.5	2.6
D06	4.0	2.8	2.7	3.8
D07A	4.0	1.3	2.6	2.2
D08	4.0	1.5	1.8	2.1
D09	4.0	2.9	3.0	3.7
D10	4.0	2.8	3.5	3.8
D20	4.0	3.0	4.5	<1.5
D23B	4.0	1.5	2.0	2.0
D25	4.0	2.2	3.2	3.1
D26	4.0	1.4	3.2	2.5
DA	4.0	1.8	3.7	2.5

Summary of Annual Average TSP Monitoring Results

Site	Annual Average TSP Criteria ($\mu\text{g}/\text{m}^3$)	Period	2021 Annual Average TSP ($\mu\text{g}/\text{m}^3$)	2020 Annual Average TSP ($\mu\text{g}/\text{m}^3$)	2019 Annual Average TSP ($\mu\text{g}/\text{m}^3$)
HV1	90	All run days	64.1	74.0	123.5
		Excluding extraordinary events	-	69.1	102.2
HV2	90	All run days	55.3	70.2	112.5
		Excluding extraordinary events	-	62.6	87.0
HV3	90	All run days	41.7	50.9	85.2
		Excluding extraordinary events	-	45.1	65.3
HV4	90	All run days	44.7	58.8	95.1
		Excluding extraordinary events	-	53.2	72.9
HV6	90	All run days	76.0	96.5	142.6
		Excluding extraordinary events	-	87.7	117.6

Summary of Annual Average PM10 Monitoring Results

Site	Annual Average PM10 Criteria (µg/m ³)	Period	2021 Annual Average PM10 (µg/m ³)	2020 Annual Average PM10 (µg/m ³)	2019 Annual Average PM10 (µg/m ³)
PM-1	25	All Run days	20.1	25.7	49.3
		Excluding extraordinary events	-	21.9	33.6
PM-2	25	All Run days	17.0	22.7	37.9
		Excluding extraordinary events	-	20.0	26.6
PM-3	25	All Run days	15.6	26.5	38.7
		Excluding extraordinary events	-	23.8	26.1
PM-4	25	All Run days	24.1	32.0	48.9
		Excluding extraordinary events	-	27.3	37.0